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THE PUBLIC HEALTH SERVICE RESEARCH PROGRAM IN AIR POLLUTION

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Cincinnati, Ohio

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THE PUBLIC HEALTH SERVICE RESEARCH PROGRAM IN AIR POLLUTION

by

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Public Health Service
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

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THE PUBLIC HEALTH SERVICE RESEARCH PROGRAM IN AIR POLLUTION

In setting up its air pollution research program, the Public Health Service has taken the view that the principal research resource of the nation lies in its universities, research institutes, and in the research establishments of American industry. In order to make maximum utilization of this tremendous research potential, two mechanisms are being employed: research grants and research contracts. Although both these mechanisms are aimed at tapping the same group of non-Federal researchers and research facilities, they do so by different means.

Research Grants and Research Contracts

The research grant seeks to elicit the research ideas of these researchers and to provide funds to let them undertake studies and experimental work based upon their own ideas. Since such ideas arise from all parts of the country and from persons of diverse professional skills and backgrounds, this approach has the major virtue of freeing the investigative process from the strait jacket of the limited concept of any single individual or small guiding group.

However, the very spontaneity and diversity of such ideas would tend to give a shotgun pattern to the resultant research. Certain areas of interest to individual researchers will by this mechanism be intensively investigated at the same time that other areas go untouched. To fill in the gaps, it is necessary to have a means by which some coordinating agency, in this case the Public Health Service, can contract with this same group of researchers for projects conceived by the Service as necessary for an integrated approach to the air pollution problem. This is the research contract.

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Application for Research Grant

Since many of you may be potential applicants for research grants and potential recipients of research contracts, a more detailed exposition of these is in order. Specifically, there is available a lump sum earmarked for air pollution research grants. In the present fiscal year, it is a half-million dollars. Those who wish some of this money for support of their own research effort must make application on forms available for the purpose from any regional office of the Service, from the Sanitary Engineering Center in Cincinnati, from the Service headquarters in Washington, or from the Division of Research Grants, National Institutes of Health, Bethesda, Maryland. As would be expected, the applicant must describe the proposed research, its objectives, the means to be employed in trying to reach the objective, the equipment and facilities available to the researcher, the new equipment or facilities that would have to be acquired with research grant funds, the personnel proposed, their qualifications, and last, but most important of all, the qualifications of the applicant or principal researcher, who must be one and the same person.

Use of Research Grant Funds

Research grant funds may be used to pay the salary of the principal investigator and the salaries of those who work on the project under his supervision, provided all or part of the salaries of professional personnel be paid from research grant funds only to the extent that they have previously been paid from other than regular institution funds. Since there is a limit of fifteen percent overhead, it is appropriate in a research grant application that the institution sponsoring the research underwrite some of the cost of the study, at least to the extent of the remainder of the overhead costs.

Actually, the applicant institution may choose to carry a larger share of the project costs, or to solicit for funds from sources other than the Public Health Service research grants program for sharing the costs of the project. Although the grant is made to one or several designated principal researchers, they must be sponsored by an institution which on the application must indicate its willingness to accept responsibility for the study and for the administration of the grant funds. Should the principal researcher change institutions, the research grant does not automatically move with him nor can the sponsoring institution automatically apply research grant funds to support someone other than the designated principal researcher. Such changes can be made only after specific Public Health Service approval.

Approval of Research Grants

Upon receipt by the Public Health Service, a research grant application is referred to a study section made up of eminent engineers, scientists, and physicians, most of whom are non-Federal employees, who recommend approval, disapproval, or deferral of the application on its merits or ask to have it resubmitted after revision or amendment, and who finally give approved applications a priority rating. The applications from all study sections, after review by the National Advisory Health Council, and approval by the Surgeon General, are then supported to the extent of the availability of funds. For instance, if there are a million dollars worth of accepted applications and only a half-million dollars of available funds, the half-million dollars worth having the highest priority will receive support. The remaining projects that do not receive funds may subsequently receive support if and when additional money becomes available in the same or a subsequent fiscal year, provided new applications of higher priority sufficient to use up available funds are not approved in the interim.

Projects Receiving Grant Support

The first batch of projects to receive grant support from categorical air pollution funds were ten projects totaling $295,367 announced on October 3, 1955. They ranged from a minimum of $10,982 to a maximum of $69,209 for the current fiscal year and covered such diverse subjects as "the effect of atmospheric fluorides on man" and "a study of particulate air pollutants resulting from combustion". Several of these projects are planned for a longer period than one year. In fact, the application must indicate the anticipated length of the project and an estimate of its cost over the total time period. Where a project which is approved for more than one year's length is given a one year's grant, which is all that can be given with the funds available in any one year, there is an implicit promise of continued support for the full approved duration of the project provided sufficient research grant funds are appropriated in future years. The years of support approved may be the same or less than that requested by the applicant.

Research Contracts

Since the form of research contracts (as distinguished from research grants) is, at the time of writing, still under study, no such contracts have as yet been let. There is, however, an appropriation this year for a quarter of a million dollars for such contracts, and they will be negotiated during the next several months. Since both reasonable overhead and profit (for profit-making organizations) can be allowed in such contracts, they can be let to both profit-making research organizations and self-sustaining non-profit research institutes. It is anticipated that the size of individual contracts will be in the same range as has been indicated for research grants. There is nothing in the enabling legislation to prevent a

municipality or a state from acting as sponsor for a research grant or of accepting a research contract.

Federal Research

In addition to fostering research in non-Federal establishments, the various Federal agencies themselves are undertaking a substantial air pollution research effort, a large part of which is being conducted by Federal agencies other than the Public Health Service, using funds appropriated by Congress to the Service. Specifically, $400,000 is being provided this year for research by the Weather Bureau and the Bureau of Standards of the Department of Commerce, and by the Bureau of Mines of the Department of Interior, using Public Health Service reimbursement funds.

The Weather Bureau has accepted the largest of these interagency commitments and has among other things established a field station at the Sanitary Engineering Center in Cincinnati. Weather Bureau and Public Health Service personnel are now working there side by side in a research effort to explore more fully the relationships between meteorology and air pollution, and will soon be working side by side in field studies in several parts of the United States.

The Bureau of Mines has accepted research studies on the composition of automobile exhaust, the design of incinerators, and the removal of SO_2 from stack gases; it will make available for these studies some of the best research facilities and personnel in these fields in the nation.

The Bureau of Standards' special area of interest is the development of methods and instruments for analyses of gases and vapors in the atmosphere.

This is being done both at the Bureau's central research establishment in Washington and in the field. The areas chosen for field studies include Los Angeles, Louisville, and other cities having atmospheric contaminants of an extremely complex nature.

There has been some public misunderstanding to the effect that the passage of the Air Pollution Act (Public Law 159 of the 84th Congress) would result in the availability of five million dollars a year for the next five years, partly for formula grants-in-aid to states and localities. This is in error on two counts. First, although the act sets an appropriation ceiling of that amount, the actual appropriation for this fiscal year is under two million dollars. Second, the law includes no authorization for formula grant-in-aid appropriation for air pollution purposes. However, it does authorize grants for research, training, and demonstration projects.

The direct research activities of the Service, that is, those conducted by its own staff, are, although only half as large as the $1,150,000 extramural effort already described, nonetheless large and formidable in their own right. The medical portion of the program is being handled by the Division of Special Health Services in Washington.

Medical Research by Public Health Service

The studies being undertaken by the Division of Special Health Services include statistical, epidemiological, toxicological, and physiological studies of the effect of air pollution on the health of man. These studies include:

1. Statistical studies to evaluate morbidity and mortality rates in relation to residence in areas of general or specific air pollution.

2. Epidemiological studies in regions of acute or of chronic exposure to air pollution.

3. Studies in the toxicology of specific air pollutants and development of new sensitive methods essential for determination of the health effects of pollutants in very low concentration.

4. Medical re-evaluation of standard diagnostic criteria of symptoms and diseases with respect to possible air pollution etiology. For example, correlation will be sought between residence in given areas and the occurrence of specific cell types of lung cancer as evidenced by examination of microscopic slides of lung cancer tissue.

For the furtherance of these medical studies 80 percent of this year's research contract funds have been allocated as well as a substantial part of the direct research efforts of the Service.

Non-Medical Reserach by Public Health Service

The non-medical portion of direct research is being handled by the Sanitary Engineering Center of the Division of Sanitary Engineering Services in Cincinnati. This latter group, which is responsible for technical assistance on air pollution to states and communities, as well as for basic air pollution research, is for research purposes divided into the following units:

Engineering Research and Development

Chemical Research and Development

Instrument and Methods Development

Meteorology

Much of the technical assistance to states and communities involves important elements of research and has resulted in the setting up of long-term cooperative Federal-state-local studies in several areas of the United States.

Engineering Research and Development

The Engineering Research group of the Air Pollution Program of the Public Health Service has as its general area of activity the determination of the nature and quantity of effluents discharged to the atmosphere, and the development of means for the reduction of the quantity or change in the nature and quantity of such effluents. In connection with this responsibility, it is developing a pilot plant and testing facility at the Center. Specific projects being undertaken this year are: An experimental study of the factors affecting the design and performance of fabric filters of the type known in industry as bag houses, dust arresters, or cloth dust collectors; an experimental study of some incinerator design factors; field studies of effluents from the cotton ginning industry and their control; and an evaluation of the various forms of micro-Ringelmann charts for measuring smoke density. In addition, this group has assigned one man full time to work with the State of California and the Los Angeles County Air Pollution Control District to assist them in their study of petroleum refinery effluents.

Chemical Research and Development

The principal research activity of this group is the National Air Sampling Network, now in its second year. This involves the collection of air samples from all parts of the United States on a routine basis and their shipment to the Center at Cincinnati for chemical analysis. This effort is, for the first time, giving a unified picture of the general pollution levels of the nation, and will prove a potent tool when correlated with the epidemiology of air pollution under study by the medical section of our program.

Instrument and Methods Development

No fields of air pollution research need more new approaches than the development of automatic instrumentation for 24-hour-a-day monitoring and surveillance of the atmosphere and the study of the exact nature of the atmospheric contaminant. One of the most exciting areas of investigation is the influence of exotic pollution on smog formation over urban areas. We feel now that we must look beyond the pollution produced by the afflicted city to the contaminant coming in with the supposedly "clean air" from the countryside, the sea, or the lakes. There are many indications that the interaction between local and foreign contaminants may, for many communities spell smog. All these areas are now under study by this group.

Meteorology

The Weather Bureau team at the Sanitary Engineering Center has for its current projects studies in each of the following project areas: Definition and prediction of smog episodes; relationships between meteorological variables and air pollution levels; trajectories and air mass modifications; feasibility study of modeling atmospheric transport and diffusion; and development of a mobile meteorological unit and of a fixed station for the Center. In addition, by tying in the meteorological group with the several field studies under way, a new approach to air pollution sampling is being developed in which predictive meteorological data in large measure determines the kind of air sampling to be undertaken.

Air Pollution Training

Although not specifically research, no discussion of the Public Health Service program in air pollution can conclude without mention of its training program for air pollution personnel. This program was kicked off by a seminar in September, 1955, at which over 90 percent of the population

was represented by persons officially designated by their respective states. Next spring a similar seminar is being held for representatives of local communities, and, in addition, three technical short courses are being offered in certain of the chemical, engineering, and meteorological phases of air pollution.

Conclusion

One of our eminent California colleagues has proposed that we discard the term "air pollution" and, instead, talk only about air as a resource, because air is truly our greatest natural resource. A resource connotes a limited supply and a need for conservation. Air fits these criteria, for, contrary to popular belief, it is in limited supply and in real need for conservation. In fact, if in the next century we fail to improve the protection of our atmosphere, it may well be the air resource that will limit our growth as a nation.

It is hardly necessary to point out to Civil Engineers that it has been the transport from great distances of water, fuel, electricity, materials, and food that has allowed big cities to grow. In fact, the only major resources we cannot transport to a community are its air, its weather, and its climate. In the case of these resources, we must learn to live with the local supply.

It has been said that our efforts to maintain our air resource are in the same stage of development now that our efforts to maintain our water resource were a century ago. Our goal should be to make as rapid progress in safeguarding our air during the next several decades as you have made and are still making in protecting our water resources.